DEEP OCEAN OBSERVING STRATEGY

Background & Need

The deep ocean below 200 meters is the largest habitat for life on Earth. It covers two-thirds of the surface area of the planet and has a maximum depth that reaches greater than six miles or almost 11,000 meters.

Access to the vast and remote environment of the deep ocean has advanced in recent decades through technological developments such as direct and targeted observations, human-occupied submersibles, remotely operated vehicles (ROVs), towed instruments, and free-vehicle 'landers' equipped with cameras and biogeochemical sensors. These observations have changed our original view of the deep ocean as a homogeneous, dark, static environment hosting relic, "fossil like" fauna. Research has revealed highly diverse deep-sea floor habitats, new ecosystems that challenged scientists' views of life on our planet, and a realm that is vulnerable to disturbance.

Despite these advances, less than 1 percent of the sea floor has been sampled or monitored and most species remain undescribed, hence we remain largely ignorant of how deep-ocean ecosystems change in space and time, both naturally and in response to human activities (Ramirez-Llodra et al., 2010). However, what we do know is enough to call for action.

Process-based ecological studies over the past three decades have demonstrated that the deep sea is far from being a dormant, buffered system; it can respond rapidly to a range of powerful drivers and pressures that span space and time scales. These include pulses of sinking decayed organic matter, pollution by hydrocarbons and littering, emissions from volcanic vents, large carcass-falls, turbidity currents, shifts in ocean currents, and temperature and oxygen stress.

The ocean is the memory of the climate system, with a potential to store one thousand times more heat than the atmosphere and ten times more carbon. The oceans have taken up about 93% of the enormous amount of thermal energy accumulating in the Earth's climate system over the last four decades (IPCC, 2013). Understanding how much heat the globe is taking up and where (how deep in the ocean) is vital to understanding how much, and how fast, the earth will warm with increased greenhouse gas concentrations.

Until recently there has been no entity or framework that brings together the broad range of expertise required to identify the challenges and seek solutions that will advance our understanding of and maintain the functioning and services of the deep ocean. Advanced technologies and costly at-sea operations make the deep ocean a domain that is only routinely accessed by scientific and industrial researchers funded by a subset of wealthy nations and multinational corporations. Complicating matters further, the deep ocean spans national and international waters, and, while there is no single governance regime for this realm, the impact of changes to our deep ocean will be felt by all. Improved technologies and strategies are required in order to adequately manage this vast area (Williams et al. 2010). A global initiative is needed to address the important challenge of sustainably managing our deep ocean.

http://deepoceanobserving.org/about/background-need/